

# SAFE VEGETABLE PRODUCTION USING IPM TECHNOLOGIES

Vegetable production in Bangladesh is characterized by high and unsustainable use of toxic pesticides. Several vegetables, viz. summer eggplant, cucurbits, beans, okra etc. are being sprayed everyday or at alternative days to produce marketable fruits by consuming around 30-40% of total production costs. Nevertheless, pesticide abuse is widely practiced and sometimes no waiting periods used before harvest. These excessive uses of toxic pesticides create substantial health impact by leftover residues of pesticides and have adverse effects on environment. So, pest management still remains one of the most important limiting factors affecting vegetable production. Several noteworthy technologies on alternatives to toxic pesticide have already been developed at BARI but that is not enough. There are still many pests those need immediate attention for developing alternate tactics of toxic pesticides for their effective control, as well as those developed IPM packages should also be up scaled. So, a holistic and sustainable way of toxic pesticide free pest management is thereby needed for boosting up country's total vegetables production by reducing the pest management cost. Due to that a coordinated sub-project "**Development and Up Scaling of Integrated Pest Management Technologies in Vegetable Crops**" has been undertaken.

## Approach and Methodology

- Development of new IPM technologies through participatory field research.
- Farm level up scaling studies on the already developed/matured IPM technologies.
- Awareness building of both farmers and consumers on the safe vegetable production and consumption.
- Socio-economic impact assessment of the IPM technologies.
- Publications of the project outputs/deliverables.

## Achievements

### Development of new IPM technologies:

This is the main activity of the project. Already eight (08) new technologies on different devastating pests of five (05) vegetable crops have been developed.

- **Bio-rational based management of tomato fruit borers:** Lowest fruit damage and highest yield can be ensured with high benefit cost ratio with the developed IPM technology.



Severely infested tomato with borers (Sprayed field)

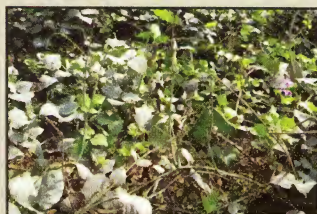


IPM trial field on early summer tomato

- **Resistant variety against tomato leaf curl virus:** Tomato line TLB 182 has been selected as moderately resistant against tomato leaf curl virus & its vector, whitefly. Very low leaf curl virus infestation was happened in that line with high yield.
- **Management approach against pod borer of yard long bean:** Lowest pod damage and highest yield can be ensured with high benefit cost ratio using newly developed IPM package of pod borer of yard long bean.



- **Management package against insect pest complex of country bean:** Lowest pod damage and highest yield can be ensured with high benefit cost ratio using bio-rational based pest management of country bean.
- **Moderately resistant okra germplasm against insect pests and diseases:** okra genotype, BARIEnto 01 showed moderate level of resistance against okra yellow vein mosaic virus, jassid, whitefly and okra shoot & fruit borer. Very low virus infestation with high yield can be ensured by cultivating this germplasm.



Insecticide sprayed country bean field



Country bean IPM field



Virus susceptible BARI Dheros 1



Virus resistant germplasm BARIEnto 01

- **IPM of okra shoot and fruit borer:** Sanitation, pheromone bait trapping and 3-4 application of bio-pesticide can ensure lowest fruit damage and highest yield with high benefit cost ratio of okra.
- **IPM packages against leaf eating caterpillars of cabbage/cauliflower:** Pheromone bait trapping and inundative release of bio-control agents can ensure lowest head damage and highest yield along with high benefit cost ratio in comparison to sole pesticide applied fields in cabbage/cauliflower.
- **Management of common cut worm attacking aroids:** Lowest stolen damage and highest yield along with high benefit cost ratio can be ensured by sex pheromone bait trapping and inundative release of egg and larval parasitoid in aroid.



Severe infestation of leaf eating caterpillars in pesticides sprayed fields



Pheromone & bio-control based IPM package



Severely damaged aroids leaf with borer



IPM trail field in aroid at Panchbibi

## Farm level up scaling studies on the IPM technologies

A total of 47 trials have been set on developed IPM technologies against the major pest problems of four vegetables, viz. eggplant, cucurbits, cabbage and beans at wider scale in the farmer's field during project period. Two technologies, viz. sex pheromone based management of eggplant shoot and fruit borer & Fruit fly control in cucurbit crops using IPM package have been up scaled.



Pheromone based IPM package against eggplant shoot & fruit borers



Continuous mass trapping with pheromone 'cuelure' against cucurbit fruit fly.





Matia Chowdhury, Honorable Minister for Agriculture in an IPM farmers gathering at Nakla, Sherpur



IPM trial field visited by Honorable Minister, MOA at Nongarpur, Jessore

## Awareness building program for both farmers and consumers

- **Training program:** Eight Trainers Training (TOT) program (total participants 320) and fifteen Training of IPM operators & progressive farmers (total participants 750) have been arranged.
- **Workshop:** Two national workshops have been arranged. Participants (300) were NARS scientists, academicians, GO, NGO Extension personnel, policy makers (including Honorable Minister, MOA).
- **Grand field days:** Four grand field days were arranged in the IPM trial areas. Participants (600) were vegetable farmers, consumers, extension personnel, policy makers and media personnel.
- **Media coverage:** Nine television program were telecasted on different TV channels and ten newspaper publications were done on project activities.
- **Publications:** Six booklets on the developed technologies are in press for publication (to be published within October 2012), one book on integrated pest management of vegetable crops is in preparation (to be published within next December 2012) and four journal articles have been submitted for publication in the national journals.



Local Member of Parliament in an IPM field day Fulbaria, Mymensingh



Executive Chairman, BARC in an IPM field day Panchbibi, Joypurhat



Training of progressive farmers on developed IPM technologies Fulbaria, Mymensingh



Training of progressive farmers on developed IPM technologies Mirsharai, Chittagong





## Economics of IPM in major vegetable crops

Sl. No.	IPM Packages	Percent yield increase of healthy crops over non-IPM	Percent reduction of pest management cost over non-IPM
01.	IPM of cucurbit fruit fly in bitter gourd	40-43	50-52
02.	IPM of cucurbit fruit fly in sweet gourd	58-65	32-35
03.	IPM of cucurbit fruit fly in cucumber	25-30	28-35
04.	IPM of eggplant shoot and fruit borer	35-42	40-45
05.	IPM of cabbage leaf eating caterpillar	30-32	32-42
06.	IPM of borers and aphids in country beans	40-45	30-32
07.	IPM of borers in aroids	35-40	35-40
08.	IPM of borers in tomato	25-28	35-40

Non-IPM = Sprayed fields with insecticides.

## Major impacts of IPM technologies

- Declining trend of national pesticide use.
- Private companies became active in IPM input commercialization business.
- Legal procedures for IPM inputs viz. pheromones, bio-pesticides etc has been opened.
- Commercial private entrepreneurs, viz. La Plancha, FASAL, ECDEF Foundation etc. are facilitating the production and marketing of safe vegetable products from farmers' fields to the consumers.

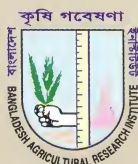
**Safe vegetable production is not a dream now, it's a reality.**

**Way forward:** The generated technologies through this sub-project will be transferred to DAE for disseminating to the end users.

**Lesson learned:** Pest management is a dynamic process, so research and development works on vegetable pest management should be continued.

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**For details, please contact :**

Dr. Syed Nurul Alam, Chief Scientific Officer & Head, Entomology Division, Bangladesh Agricultural Research Institute  
Joydebpur, Gazipur, Tel: 9256404, Mobile: 01711 907886, E-mail: cso.ento@bari.gov.bd